196. Proposed by L. E. NEWCOMB, Los Gatos, California.

Find the rth term of $\left(x-\dfrac{1}{x}\right)^n\equiv z^n$ in terms of z.

I. Solution by G. W. GREENWOOD, B. A. (Oxon), Professor of Mathemrtics and Astronomy, McKendree College, Lebanon Ill.

Let $x=\cos\theta+i\sin\theta$, then $z=2i\sin\theta$, and $x^p=\cos p+i\sin p\theta$. This enables us to express any term of $(x-1/x)^n$ in terms of θ, *i. e.*, in terms of z.

II. Solution by F. D. POSEY, A. B., San Mateo, Cal.; G. B. M. ZERR, A. M., Ph. D., Parsons, W. Va., and GRACE M. BAREIS, Bala, Pa.

$$x-1/x=z,\ \therefore x=\frac{z\pm\sqrt{(z^2+4)}}{2}.$$

The rth term of $(x-1/x)^n$ is $\dfrac{(-1)^{r-1}n(n-1)\ldots\ldots(n-r+2)}{(r-1)!}x^{n-r+1}\left(\dfrac{1}{x}\right)^{r-1}$

$$=\frac{(-1)^{r-1}n(n-1)\ldots\ldots(n-r+2)}{(r-1)!}x^{n-2r+2}$$

$$=\frac{(-1)^{r-1}n(n-1)\ldots\ldots(n-r+2)}{(r-1)!}\left(\frac{z\pm\sqrt{(z^2+4)}}{2}\right)^{n-2r+2}.*$$

197. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, O.

Solve $(18)^{4(2-x)}=(54\sqrt{2})^{3x-2}$.

Solution by W. W. LANDIS, Dickinson College, Carlisle, Pa.

Writing the equation in the form (1).....$18^{4(2-x)}=18^{\frac{3}{2}(3x-2}$ we find $x=\frac{22}{17}$.†

Also solved by G. W. Greenwood, J. E. Sanders, A. H. Holmes, F. D. Posey, R. A. Wells, G. I. Hopkins, H. R. Higley, G. B. M. Zerr, E. L. Sherwood, Grace M. Bareis, J. Scheffer, L. E. Newcomb.

GEOMETRY.

219A. Proposed by H. F. MacNEISH, A.B., Assistant in Mathematics. University High School, Chicago, Ill.

Draw through a given point a line which shall divide a given quadrilateral into two equivalent parts: (1) when the point lies in a side of the quadrilateral; (2) when the point is without; (3) within the quadrilateral.

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*Dr. Zerr also gives the values

$$(-1)^{r-1}{}_nc_{r-1}(z+1/z-1/z^3+1/z^5-\ldots\ldots)^{n-2r+2},$$

$$(-1)^{r}{}_nc_{r-1}(1/z-1/z^3+1/z^5-\ldots\ldots)^{n-2r+2}.$$

†Owing to the periodicity of the exponential function a^y may be written $e^{y\log a+2n\pi i}$ (n=integer). It now follows from (1) that $e^{[\frac{1}{2}(22-17x)]\log 18+2n\pi i}=1$, whence $\frac{1}{2}(22-17x)\log 18+2n\pi i=0$, and therefore $x=\frac{22}{17}+(4n\pi i/17\log 18)$. When $n=0$, $x=\frac{22}{17}$. ED.